

REMARKS

Claims 1, 3-8, and 10-24 are now pending in the application. Claims 8, 16, and 19 are amended. Claims 21-24 are added.

The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 112

Claims 16 and 19 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which Applicants regard as the invention. This rejection is respectfully traversed.

While Applicants do not acquiesce in the Section 112 rejections, Applicants nevertheless amend claims 16 and 19 to expedite prosecution. Applicants further submit that claims 16 and 19 are sufficiently definite as to permit those skilled in the art to readily understand the scope of such claims. For at least these reasons, Applicants respectfully request withdrawal of the § 112 rejection.

REJECTION UNDER 35 U.S.C. § 103

Claims 1, 3-8, and 10-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Rockwell (U.S. Pat. No. 4,030,553) in view of Jensen et al (U.S. Pat. No. 3,842,942). This rejection is respectfully traversed.

Aspects of the present application relate to providing a tool for a powered machine with vibration damping means, in order to reduce potentially injurious vibration. In particular, embodiments of the present application are primarily concerned with reducing hand-arm vibration syndrome in operators of powered tools.

According to various aspects of the invention, the tool in use is modeled as having hinged-free boundary conditions, with the tip of the shaped working end hinged and the tip of the striking end free. The position of at least one antinode of the vibration along the tool shank is estimated. A damping member is then fitted around the body of the tool, located to cover at least one estimated antinode position.

During operation of a powered tool, a plurality of different waves may be introduced to the tool. The inventors hereof have recognized that longitudinal waves contribute to transmitted vibration (and hence to hand-arm vibration syndrome) and transverse (flexural) waves contribute to sound output. Due to the establishment of

different wave types within a powered tool, the reduction of undesirable vibration therefrom is a complex problem.

Aspects of the present invention are concerned with reducing the reflection of energy carried by waves introduced into the tool by the driver, in order to reduce potentially injurious vibration transmitted to the operator of the tool. Aspects of the present invention also have the effect of reducing undesirable noise.

To this end, independent claim 1 recites a method for providing a tool for a powered machine. The tool comprises a body having a shaped working end and a striking end. The tool also includes vibration damping means. The shaped working end has a tip, and the striking end has a tip. The method comprises determining an estimated antinode position of vibration of the tool in use when the tip of the shaped working end is hinged and the tip of the striking end is free to vibrate, and locating a vibration damping member around the body of the tool to cover the antinode position.

Independent claim 8 recites a tool for a powered machine. The tool comprises a body having a shaped working end and a striking end. The tool also includes vibration damping means. The shaped working end has a tip, and the striking end has a tip. The vibration damping means comprises a vibration damping member located around the body of the tool to cover an estimated antinode position of vibration of the tool in use when the tip of the shaped working end is hinged and the tip of the striking end is free to vibrate. Claim 8 further recites that the tool is manufactured by a method comprising the steps of determining an estimated antinode position of vibration of the tool in use when the tip of the shaped working end is hinged and the tip of the striking end is free to vibrate; and locating a vibration damping member around the body of the tool to cover the antinode position.

Rockwell in view of Jensen does not disclose, teach, or suggest each and every feature of claims 1 and 8, and accordingly, do not render obvious claim 1 or 8.

Rockwell, U.S. Patent No. 4,030,553

Rockwell discloses a method of constructing a percussion tool having noise damping characteristics, and a tool so constructed.

Rockwell teaches identifying a troublesome noise frequency radiated by the tool in use, determining a resonant bending mode shape corresponding to the identified troublesome noise frequency, selecting an antinode of the determined resonant bending

mode shape and then introducing an impedance mismatch at a selected distance from the selected antinode.

According to Rockwell, the impedance mismatch is a structural discontinuity along the tool, which is created by forming the tool in sections of predetermined length.

Accordingly, the claimed inventions therefore utilize a different type of modification of a tool to thereby change vibration of the tool in use than Rockwell.

It is acknowledged that Rockwell discloses embodiments (shown in Figs. 6, 7, and 8) in which two tool sections are force fitted together and an outer sleeve is used to maintain the joint. But Rockwell further discloses at Column 5, Lines 50-54 that "In the embodiments of FIGS. 6, 7, and 8 the outer sleeve itself does not materially contribute to the impedance mismatch but rather serves to hold the parts in assembled relationship." In addition, Applicants have not found any disclosure whatsoever in Rockwell regarding the material fabrication of the outer sleeve. It is therefore respectfully submitted that the Rockwell outer sleeve of the embodiments illustrated in Figs. 6, 7, and 8 of Rockwell is not a vibration damping member.

It is also respectfully submitted that Rockwell does not teach the use of a vibration damping member to reduce vibration of a tool in use, and Rockwell does not teach locating a vibration damping member around the body of a tool, as featured in independent claims 1 and 8.

Further, according to the method of Rockwell, the resonant bending mode shape corresponding to the identified troublesome noise frequency is determined by comparing the identified troublesome noise frequency with the frequency of resonant bending modes shapes of a beam bending under different boundary conditions. The potential end conditions are listed in Table 1 of Rockwell, and include the end conditions "hinged-free". But Rockwell does not provide any teaching regarding which end of the tool is to be considered as "hinged" and which end is to be considered as "free".

For at least these reasons, Applicants respectfully submit that Rockwell does not teach determining an estimated antinode position of vibration of a tool in use when the tip of the working end is hinged and the tip of the striking end is free to vibrate, as recited in independent claims 1 and 8.

Jensen U.S. Patent No. 3,842,942

Jensen discloses a method of constructing a percussion tool having noise suppression means, and a tool so constructed.

Jensen teaches providing the tool with a vibration damping tube component. According to Jensen, the vibration damping tube component extends substantially along the entire length of the tool shaft.

It is respectfully submitted that Jensen does not teach determining an estimated antinode position of vibration of the tool in use, as featured in independent claims 1 and 8.

Rockwell in view of Jensen

Rockwell discloses at Column 5, Lines 7-12 that providing the tool with an impedance mismatch in the form of a structural discontinuity provides noise reduction without causing an appreciable increase in weight or bulkiness of the tool.

Jensen discloses at Column 1, Lines 26-34 that providing the tool with a vibration damping tube component provides noise reduction with little reduction in the practical use of the tool by added weight or obstructions.

Accordingly, it is respectfully submitted that Rockwell and Jensen provide different solutions of different complexity to the problem of providing a tool with noise reduction whilst reducing the effect of the noise reduction means on the usability of the tool.

It is therefore respectfully submitted that it is not obvious to combine the teachings of Rockwell and Jensen, or obvious how the different teachings may be combined, since each provides an independent solution to the same problem.

Starting with Rockwell, it is considered that one having ordinary skill would not contemplate locating the vibration damping tube component of Jensen around the tool, since Rockwell provides an alternative solution and teaches reducing the addition of weight or bulk to the tool.

Starting with Jensen, it is considered that the one having ordinary skill would not contemplate performing the method of Rockwell to determine a location for the vibration damping tube component, since Jensen merely teaches locating the vibration damping tube component to extend substantially along the entire length of the tool shaft.

In light of the different teachings of Rockwell and Jensen, it is considered that if there was any motivation to substitute structural discontinuities of Rockwell with a vibration damping tube component of Jensen, then a tool according to Jensen would result and vice versa. It is thus submitted that if the teachings of Rockwell and Jensen were considered together, claims 1 and 8 would still not be obvious.

For at least the above reasons, it is submitted that independent claim 1 and independent claim 8 are each novel and non-obvious over the cited patents.

With regard to dependent claims 3-7, and 10-20, these claims each depend from independent claim 1 or 8 shown above to be allowable. Accordingly, Applicants respectfully submit that claims 3-7 and 10-20 are also allowable for allowance for at least the reasons given above in connection with the independent claim from which it depends.

NEW CLAIMS

New claims 21-24 are supported by the application as originally filed. Accordingly, no new matter is introduced by the addition of claims 15-20.

In addition, claims 21-24 each depend from an independent claim shown above to be allowable. Accordingly, Applicants respectfully submits that dependent claims 21-24 are also in condition for allowance for at least the reasons set forth above in connection with the independent claim from which it depends.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (314) 726-7502.

Applicants believe that the appropriate fees have been included with this filing. If, however, Applicants owe any additional fee(s), the Commissioner is hereby authorized to charge the fee(s) to Deposit Account No. **08-0750**. In addition, if there is ever any other fee deficiency or overpayment under 37 C.F.R. §1.16 or 1.17 in connection with

this patent application, the Commissioner is hereby authorized to charge such deficiency or overpayment to Deposit Account No. **08-0750**.

Respectfully submitted,

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